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NP-33-03-005-00

Docket No. 50-346

License No. NPF-3

June 30, 2003

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Ladies and Gentlemen:

LER 2003-005
Davis-Besse Nuclear Power Station, Unit No. 1
Date of Occurrence – May 2, 2003

Enclosed please find Licensee Event Report (LER) 2003-005, which is being submitted to provide written notification of the inoperability of the Containment Hydrogen Analyzers due to the isolation valves for the Containment Hydrogen Analyzer Heat Exchangers discovered in the closed position. Two independent hydrogen analyzers are required to be operable in Modes 1 and 2 by Davis-Besse Nuclear Power Station Technical Specifications 3.6.4.1. This LER is being submitted in accordance with 10CFR50.73(a)(2)(i)(B).

Very truly yours,

AWB/s

Attachments

cc: Mr. J. E. Dyer, Regional Administrator, USNRC Region III
Mr. C. S. Thomas, DB-1 NRC Senior Resident Inspector
Utility Radiological Safety Board

IE22

COMMITMENT LIST

The following list identifies those actions committed to by the Davis-Besse Nuclear Power Station in this document. Any other actions discussed in the submittal represent intended or planned actions by Davis-Besse. They are described only as information and are not regulatory commitments. Please notify the Manager - Regulatory Affairs (419-321-8450) at Davis-Besse of any questions regarding this document or associated regulatory commitments.

COMMITMENTS	DUE DATE
Gate valves CC274, CC275, CC277, and CC278 will be permanently removed from the CCW containment gas analyzer system and replaced with pipe spools.	Prior to restart.
Upon completion of the corrective action to remove the redundant containment gas analyzer heat exchanger valves (CC274, CC275, CC277, and CC278) and the heat exchangers, a flow check will be performed on the cooling side of the heat exchanger and the need to perform subsequent flow tests in the future will be evaluated.	Prior to restart.

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Davis-Besse Unit Number 1	05000346	1 OF 5

4. TITLE

Containment Gas Analyzer Heat Exchanger Valves Found Closed Rendering the Containment Gas Analyzer Inoperable

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
05	02	03	2003	-- 005 --	00	06	30	2003	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	5
10. POWER LEVEL	000

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v) X	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Aaron W. Bless, Associate Engineer - Licensing	(419) 321-8543

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	No				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 2, 2003, with the plant in Mode 5, it was determined that no cooling flow existed through the containment gas analyzer heat exchangers. Further investigation revealed that although the internal isolation valves allowed some movement, mechanical binding existed within the valves which prevented opening of the valves, restricting cooling flow through the heat exchanger. The containment gas analyzer heat exchangers provide cooling to the containment atmosphere sample which travels through the containment gas analyzers following a loss of coolant accident. The containment gas analyzers are designed to detect the concentration of hydrogen and alarm when excessive hydrogen is detected. Technical Specification 3.6.4.1, Hydrogen Analyzers, requires two independent containment hydrogen analyzers to be operable in Modes 1 and 2. Based on the mechanical binding which existed on each of the valves and that no maintenance activities were identified that would have required the isolation valves to be closed, it appears that these valves have been in the closed position since plant startup in 1977. Therefore, since it is assumed that without cooling flow through the containment gas analyzer heat exchangers, functionality of the containment gas analyzers is in question. This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as any operation or condition prohibited by the Technical Specifications.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

DESCRIPTION OF OCCURRENCE:

On May 2, 2003, with the Davis-Besse Nuclear Power Station (DBNPS) in Mode 5, it was discovered that there was no flow through the coolant side of the Containment Gas (Hydrogen) Analyzer Heat Exchanger.

The Containment Hydrogen Control System [BB] is designed to control the concentration of Hydrogen which may be released within the Containment Vessel atmosphere following a Loss of Coolant Accident (LOCA). The Containment Hydrogen Control System consists of four subsystems: the Hydrogen Dilution System, the Hydrogen Purge System, the Hydrogen Recombination System [BB-RCB] and the Containment Gas Analyzer System (CGAS). If a sufficient amount of hydrogen is generated, it may react with Oxygen present in the Containment Vessel [VSL] atmosphere at rates rapid enough to lead to high temperature and overpressurization of the Containment Vessel. The Containment Hydrogen Control System components are designed to be operated as necessary to maintain the maximum Hydrogen concentration in the Containment Vessel below acceptable limits following a LOCA.

The Hydrogen concentration inside containment following a design-basis accident is determined by two redundant containment gas analyzers each consisting of a heat exchanger, recombiner, a sample pump, and standby sample pump. The containment gas analyzer equipment is required to be started 30 minutes after Containment Spray System [BE] has been initiated during accident conditions to detect the buildup of hydrogen in the containment vessel. The system is mechanically connected to a containment penetration, which allows a sample of containment atmosphere to be conditioned, analyzed, and returned to the containment. The analyzer systems will initiate an alarm on excessive hydrogen concentrations.

No means to detect flow through the containment gas analyzer heat exchangers exists, therefore, temporary ultrasonic flow instrumentation was installed on several components to support performance of test procedure DB-SP-10018, "CCW Loop 1 SFAS Level 3 and Level 4 Flow Verification". This procedure was being performed to demonstrate the ability of Component Cooling Water (CCW) Loop 1 to meet its design flows during a simulated Safety Features Actuation System (SFAS) Level 3 and Level 4 actuation on May 2, 2003. Following the installation of the temporary ultrasonic flow instrumentation on the CCW supply line to the Channel 1 Containment Gas Analyzer, no flow was detected through the line. The same condition was also found on CCW supply line to the Channel 2 Containment Gas Analyzer. Initial investigation in the containment gas analyzer panel was performed to verify proper valve position (open) on each of the cabinet mounted isolation valves, CC274 and CC275 for channel 1, and CC277 and CC278 for channel 2. The valves where checked open, as guided in procedure DB-OP-01002, "Component Operation and Verification", by obtaining movement (approximately one-half a turn) in the closed direction, and initially determined to be in the correct position. However, still no flow existed through the containment gas analyzer heat exchangers. The thermal relief valves in both channels were then manually lifted to determine if there was any CCW flow or pressure from either the inlet or outlet of the heat exchanger. No water or pressure was identified from either line. Further investigation revealed that the valve handles for cabinet mounted isolation valves, CC274 and CC275 for channel 1,

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

DESCRIPTION OF OCCURRENCE (continued):

and CC277 and CC278 for channel 2, could only be turned approximately one-half a turn. An attempt was then made to open these internal isolation valves. Valve CC274, the inlet isolation valve on channel 1, was opened past its mechanical binding point and achieved approximately 1 inch of stem travel. Subsequently, a leak was identified on the bottom of the containment gas analyzer heat exchanger, apparently due to corrosion. Efforts to open the remaining three isolation valves were unsuccessful. No maintenance activities were identified that would have required the closure of valves CC274, CC275, CC277, or CC278; and therefore it appears that these valves have been in the closed position since initial plant startup in 1977. Upon discovery that the cabinet mounted isolation valves for the heat exchangers for both containment gas analyzers being mechanically bound in the closed position, the condition was entered into the DBNPS corrective action system (Condition Report 2003-03398) and the containment gas analyzers were declared inoperable.

Technical Specification 3.6.4.1, Hydrogen Analyzers, requires two independent containment hydrogen analyzers be operable in Modes 1 and 2. With both hydrogen analyzers inoperable, the limiting condition for operation requires that one analyzer be restored to operable conditions within 72 hours or for the plant to be placed in HOT STANDBY conditions within the next 6 hours. At the time of discovery the plant was in Mode 5, however, the condition is believed to have existed since initial plant startup in 1977. Therefore, since it is assumed that the plant operated with no cooling flow through the containment gas analyzer heat exchangers, the functionality of the hydrogen analyzers is in question. This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as any operation or condition which was prohibited by the Technical Specifications. Further evaluation is needed to determine whether the hydrogen analyzers were incapable of performing their design function given the absence of cooling flow to the heat exchangers.

During the review of the issue involving the isolation valves, a second condition (Condition Report 2003-04871) was discovered which could potentially render the containment gas analyzers incapable of performing their design function. The sample line from the containment gas analyzer heat exchanger passes through a water separator and the moisture is collected in a moisture trap. It was identified that a potential condition exists where the non-safety grade air supply designed to blow-down the moisture trap would not exist following a LOCA in conjunction with a loss of offsite power. Without the air supply to blow down the moisture trap, the collected condensate could potentially fill the trap and backup into the tubing to the analyzer element rendering it inoperable. This condition is being evaluated independent from the isolation valves issue and will be submitted in a separate LER if the Containment Gas Analyzers are determined to be unable to perform their design function due to this newly discovered condition.

APPARENT CAUSE OF OCCURRENCE:

In 1987, a condition was discovered which identified insufficient controls over the configuration of the plant in that numerous components, included in vendor supplied cabinets and skids, were not included on plant drawings or in plant procedures. During the review process (1987) for this condition, it was identified that the field conditions for the containment gas analyzer heat exchanger did not match plant documentation. Associated documents were revised to include valves CC274, CC275, CC277, and CC278 to reflect the as-built conditions of the containment gas analyzer heat exchanger. In 1992, procedures DB-SP-03063 and DB-SP-03064, "Component Cooling Water Train 1 Valve Verification Monthly Test" (and Train 2 respectively), were revised to include verification that each isolation valve (CC274, CC275, CC277, and CC278) is in the open position.

Operations procedure DB-OP-01002, "Component Operation and Verification", provides guidance to the operator and describes the correct way to verify a valve is open. It states: apply force to the handwheel in the close direction and when valve movement in the close direction is verified, re-open the valve. The as-found condition of the valves determined that the valve handles (and stem) rotated approximately one-half a turn, however investigation determined that there was no flow through the valves.

Because the valve handles could be moved in the closed direction, as described by procedure, this masked the fact that the valves were not in the open position. Although the valves were added to the drawings and procedures, no documentation can be found that confirmed flow through the containment gas analyzer heat exchangers after the documents were revised. Also, no maintenance activities have been identified that would have required the closing of these valves. Upon opening CC274 past the mechanical binding point that existed, a leak was identified on the bottom of the Loop 1 heat exchanger, apparently due to corrosion, which also indicated that the valve had not been opened for a significant period of time.

Therefore, based on the above, it is assumed that these valves have been in the closed position since plant startup in 1977 and this condition was the result of insufficient controls over vendor supplied equipment and configuration of the plant.

ANALYSIS OF OCCURRENCE:

With the isolation valves closed, the containment gas analyzers were declared inoperable. Following a LOCA, the heat exchanger would not provide cooling of the containment atmosphere sample prior to entering the containment gas analyzer. The DBNPS Technical Specifications require two independent containment hydrogen analyzers to be operable in Modes 1 and 2. The inoperability of the containment gas analyzer heat exchangers does not render the physical equipment required to lower containment hydrogen concentration inoperable. However, with the heat exchangers inoperable, the ability to detect post-LOCA containment vessel hydrogen concentration is in question.

ANALYSIS OF OCCURRENCE (continued):

Industry correspondence has been reviewed that documents that the relative importance of hydrogen combustion for large, dry containments, such as the DBNPS containment, with respect to containment failure, has been found to be low. The robustness of the containment vessel and the likelihood of a spurious ignition source controlling excess hydrogen buildup provide assurance that the potential for failure of large, dry containments due to hydrogen combustion is not a significant contributor to public risk. Therefore, the loss of the containment gas analyzers, which are used to detect the increase of hydrogen concentration, is of low risk significance.

Based on the uniqueness of this system, in that there is no direct or indirect means of detecting cooling water flow, this has been determined to be an isolated event.

CORRECTIVE ACTIONS:

An engineering change request has been initiated to replace the containment gas analyzer heat exchangers. Gate valves CC274, CC275, CC277, and CC278 will be permanently removed from the containment gas analyzer system and replaced with pipe spools. In the current configuration, the non-safety function of the valves provides redundant CCW isolation. Existing CCW valves installed upstream (CC238 and CC239) and downstream (CC243 and CC242) of the gas analyzer heat exchangers provide isolation when required. Upon completion of the corrective action to remove the redundant containment gas analyzer heat exchanger valves (CC274, CC275, CC277, and CC278) and the heat exchangers, a flow check will be performed on the cooling side of the heat exchanger. The need to perform subsequent flow tests in the future will be evaluated.

FAILURE DATA:

There have been no previous LERs as a result of inoperability of the containment gas analyzer system in the last three years. On July 7, 2000, LER 2000-005, "Main Steam Drain Valve Left Open Rendering Auxiliary Feedwater Pump Turbine Inoperable", was submitted to the NRC due to a valve being left open during a weekly condensate drain of the piping. The corrective actions taken in response to the 2000 event would not have prevented this current event because this reported event is a different issue in that this condition was the result of insufficient controls over vendor supplied equipment and configuration of the plant.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

NP-33-03-005-00

CRs 03-03398 and 03-04871